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A National Environmental/Energy Workforce Assessment. North Dakota

National Field Research Center, Inc, Iowa City, Iowa

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A National Environmental/Energy Workforce Assessment

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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

17. KEY WORDS AND DOCUMENT ANALYSIS

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Regional Planning	Economic Surveys		
State Planning	Energy Management		
State Agencies	Pollution Control		
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for

NORTH DAKOTA

Conducted by:

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ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

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National
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A special word of appreciation is extended to Mr. Gene A. Christianson, Director, Division of Environmental Engineering, North Dakota State Department of Health.

PREFACE

The research and development of the NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT project was conducted under the aegis of the U.S. Environmental Protection Agency by the National Field Research Center, Inc., Iowa City, Iowa, and the Denver Regional Office. This report is a summary of the State of North Dakota and is one of six state reports within Federal Region VIII.

The State of North Dakota Report presents an overview of: the current workforce, projections of workforce requirements (1976-1981), training and certification, and career potential in environmental pollution control and abatement. The environmental areas depicted within this report are: air, noise, potable water, pesticides, solid waste, waste water, radiation and energy conservation/conversion.

FOREWORD

This state report is a summary of Phase I of the NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT project in North Dakota. The information contained within this report was obtained by extensive on-site interviews and research of project related materials. The information retrieval was conducted through representative federal, state, and when time allowed, local agencies. Telephone and written surveys were utilized as a secondary research source.

Data which is not documented herein is representative of the best professional judgements of experts currently working in the field.

This study is designed specifically for use as a reference tool at the federal regional level as well as at the state level. It is anticipated that the people of the State of North Dakota will be the beneficiaries of this endeavor.

National Environmental Energy Workforce Assessment

Phase I

NORTH DAKOTA

State Summary

I. AIR

The air quality problems in North Dakota are not extensive. The air can be described as relatively clean, although the effects of air pollution have been identified in certain areas of the state.

In compliance with the U.S. Environmental Protection Agency (EPA), two Air Quality Maintenance Areas (AQMA) have been identified: The Cass AQMA, and the McLean-Mercer-Oliver AQMA.

The North Dakota Department of Health, Environmental Control Division, administers the air pollution control and abatement programs across the state through the Air Quality Program. The Air Quality Program consists of two major components: air pollution control and air quality studies.

Although no reliable figures are available at this time, the statewide workforce in air pollution control and abatement is estimated to be exceedingly small, and it is difficult to project workforce requirements for the next three to five years. Staffing increases will occur at the state level. Due to energy development related factors, the private sector should experience growth.

Limited career opportunities, particularly at the degreed level, will be available in North Dakota. Given what might be termed normal operating procedures, however, staff growth will create positions.

II. NOISE

Noise pollution control and abatement is currently being accorded a greater emphasis in North Dakota than in many of the surrounding Rocky Mountain Prairie states. An environmental noise regulation is in the process of being prepared. This would afford the state the necessary authority to administer a state noise law. North Dakota personnel feel the primary need for noise regulated legislation lies in the prevention of potential noise problems. As a consequence, enforcement tools will be available.

Problems associated with energy extraction and conversion as well as other nonagricultural activities describe the near future emphasis for noise pollution control and abatement in North Dakota.

A limited number of personnel are involved in the field of noise pollution control and abatement in North Dakota. The state administers a program through the Department of Health, Environmental Control Section, Division of Environmental Engineering.

There is little evidence that a significant number of career opportunities will develop in North Dakota over the next five years. The current workforce is quite limited and on the local level, only partial effort is allocated to noise control on the part of most personnel.

III. PESTICIDES

North Dakota is predominately an agricultural state. The Department of Agriculture maintains a staff of 26 people. In 1975, the major responsibility for the state Pesticide Act was delegated to the department. Recently, a pesticide division was added. This division is charged with providing administrative and technical direction to the enforcement of state laws that regulate application of restricted use pesticides as defined by the U.S. Environmental Protection Agency. Pesticides-related problems have neither been extensive nor severe in North Dakota. The establishment of the pesticide division, however, was in response to a need to define responsibility for training and applicator certification pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

Minimal increases are projected for the state level staff over the next three to five years. Very few changes in the number of applicators (commercial and private) is anticipated to 1982.

Pesticide problems are not extensive in North Dakota. Employment opportunities in both the private and public sector are competitive at present and will continue to be so for several years.

IV. POTABLE WATER

Overall, drinking water quality and quantity in North Dakota has been described as good. Water problems related to consumption are neither as extensive nor as numerous as in many western states. North Dakota lignite and other energy resource development impacts the quantity as well as the quality of the state's waters. Energy development, however, in most cases does not affect the drinking water supply demands to nearly the same degree as waste water treatment.

The North Dakota Department of Health has allocated responsibility for potable water to the Division of Water Supply and Pollution Control. The State of North Dakota has indicated intentions of assuming primary responsibility for the Safe Drinking Water Act. This undoubtedly will affect the workforce profile as increased monitoring, sampling, and reporting will be necessary.

Career opportunities will be available at the degreed and non-degreed levels. The availability of jobs in the drinking water field will be lessened should the state not assume primary enforcement responsibility for the Safe Drinking Water Act.

The greatest area of workforce need is in water treatment and distribution plant operating and supervisory personnel. This is the result of more strict enforcement of existing regulations, new treatment methods, and increased technologies.

V. RADIATION

The major responsibility for radiation control in North Dakota has been allocated to the Department of Health, Environmental Control Section, Division of Environmental Engineering. Public health, safety, and protection of radiation users, at once with the development and utilization of sources of ionizing and non-ionizing radiation, are primary goals of the state program.

The radiation control program in North Dakota encompasses several major areas. Currently, the staff is revising radiological health regulations. X-ray machines in the state are registered, inspected, and re-registered at three year intervals. Over the next three to five years, the workforce necessary for the Department of Health radiation control program will increase.

Career potential within the field of radiological health appears to be good over the next three to five years. The State of North Dakota will increase the workforce allocated to radiation control if uranium development increases. The widest range of career opportunities over the next five years will be on the degreed level. The private sector will require specialized areas of expertise in addition to radiation and nuclear related skills. Environmental Impact Statement expertise will become increasingly marketable in North Dakota as energy resources are developed.

VI. SOLID WASTE

Solid waste management is not a new program in North Dakota. In 1966 the Governor appointed the Department of Health as the lead agency to develop a solid waste management plan for North Dakota. The plan was approved in 1971. In 1975, the Solid Waste Management and Land Protection Act was enacted, and the authority to promulgate rules and regulations was given to the North Dakota Department of Health, Division of Solid Waste Management.

North Dakota has little heavy industry and, therefore, the disposal of hazardous industrial waste products has not been a large problem. North Dakota is an agriculturally based state. As such, pesticides, herbicides, and other compounds utilized in agricultural activities are present in the state and do require a burial or disposal site.

Due to increasing program activities and an enlarged area of responsibility, the Division of Solid Waste Management will experience staff increases over the next few years. Almost no increase is forecast for statewide personnel with the exception of landfill operators.

North Dakota is involved in very little training in the area of solid waste. A need has been established for operator training, especially in the area of hazardous waste disposal. Career opportunities will be available over the next five years, especially in resource recovery and hazardous waste disposal.

VII. WASTEWATER

According to the Office of the Assistant Attorney General of North Dakota, the state has some of the most stringent water pollution laws in the country. Approximately 50 water pollution related cases are processed through that office per year.

Most of the state's serious wastewater problems originate from agricultural and energy related activities. Under the Federal Water Pollution Control Act Amendments of 1972, provisions are made for area wide planning to control water pollution. This is referred to as Section 208 of the Act, and the planning process begins when the Governor designates a statewide or regional area as a 208 planning area. One area, which includes 10 North Dakota counties, has been so designated.

The major responsibility for water pollution control in North Dakota has been allocated to the Department of Health, the Division of Water Supply and Pollution Control which is also responsible for drinking water.

Workforce needs will be in wastewater treatment plant operations and maintenance as well as in administration. This will be a result of strict enforcement, new methods of treatment, changing technology, and plant modification and construction. Increased training and continued construction of municipal treatment facilities as well as extensive 208 planning describe the future North Dakota program.

VIII. ENERGY

The development of natural resources is an area of major concern being confronted by the people of North Dakota. This concern is dramatically displayed by the fact that the state is presently developing the final portions of a State Energy Plan for review by the Legislature. Energy extraction, conversion activities, and conservation plans need to be explored.

North Dakota has large supplies of crude oil and refined petroleum products available. The state's most urgent problems are related to coal development and the utilization of water resources. Energy development is closely aligned with water availability and allocation.

The State of North Dakota lead energy agency has been identified as the Office of Energy Management, Bismarck. The major responsibility of this agency is the administration of the federal allocation program. The staff is small. Recently, the topic of conservation also has been defined as an area of responsibility for the Office of Energy Management.

Career opportunities are expected to develop over the next three to five years for degreed and highly trained engineers, scientists, and research personnel. Few career opportunities are likely to emerge for non-degreed personnel. Increased activities most assuredly will affect the pollution control and abatement workforce of the state.

STATE OF NORTH DAKOTA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	30	30	30	32	33	33	2%
NOISE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PESTICIDES	12,875	12,766	12,661	12,523	12,389	12,289	- 1%
POTABLE WATER	235	254	271	288	308	329	7%
RADIATION	984	1,004	1,025	1,047	1,069	1,100	2%
SOLID WASTE	92	103	114	127	138	150	10%
WASTEWATER	157	169	180	192	202	211	6%
ENERGY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	14,373	14,326	14,281	14,209	14,139	14,112	- 1%

[1]Does not include the private sector.

EDUCATION

The higher education institutions of North Dakota offer a very limited number of environmental programs. Several colleges do offer majors in engineering, earth science, biology, agronomy, botany, chemistry, entomology and similar areas which can provide a good background for environmental employment.

At North Dakota State University an Environmental Studies program has been developed although a major is not available in the discipline. Also an environmental concentration is available in the earth science major. The series is designed to assist students in developing the multidisciplinary understanding that is important in finding responsible solutions to environmental problems.

On the two-year level, environmental offerings are also very limited. An Environmental Sciences Technology program at North Dakota State School of Science is apparently the only two-year course available in the state. This program grew out of, and works closely with, the Civil Technology major at the school. In 1976, all of the 10-12 graduates found placement in municipal government or with the state agencies.

LEGISLATION

The environmental/energy legislation for North Dakota was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act

Noise Control Act

North Dakota Pesticide Act of 1975

Insecticide, Fungicide and Rodenticide Act of 1947

Operator Certification Law

Solid Waste Management and Land Protection Act

Control, Prevention, and Abatement of Pollution of Surface Waters Law

Reclamation of Stripmined Land

National Environmental Energy Workforce Assessment

Phase I

NORTH DAKOTA

State Report

STATE PROFILE

Within the State of North Dakota there are 14,369 Indians, mostly Gros Ventre, Sioux, and Chippewa, which contribute to the overall population of 617,761. The chief cities of the state are Bismarck, Fargo, Grand Forks, and Minot. North Dakota is a western north central state bounded by Canada and Minnesota, South Dakota and Montana. The geographic center of North America is located at Pierce County and the mean elevation is approximately 1,900 feet above sea level. The highest point in the state is within the well known Badlands at 3,506 feet.

There are two major drainage systems within the state, the Red River and the Missouri River. The summers are short and hot and the winters are extremely cold. Temperatures range from 121° to -60°F.

Three topographical areas define North Dakota: the Valley of the Red River, the Drift Prairie, and the Missouri plateau. Approximately 600 square miles compose the forest area which is the smallest of any state in the Union.

Once herds of bison knew this land as home; now their few survivors are protected in game refuges. Two species of deer represent the only big game in the state today. Small fur-bearing animals are common and game birds like the ring-necked pheasant, wild duck, and sage hen abound.

The economy of North Dakota is agriculturally based with 42,000,000 acres,averaging 1,024 acres per farm. Agriculture is diversified, with

the principle commodities including wheat, cattle, barley, and dairy products.

Mineral resources are the second most important sector of the economy of North Dakota. Petroleum, coal, sand, gravel, and natural gas are major contributors in the field of mineral production.

POLLUTION CONTROL AND ABATEMENT AGENCIES

The following agencies are those which are involved with environmental programs within the state. Each narrative provides a review of the functions and activities of each agency as they relate to environmental programs.

NORTH DAKOTA STATE DEPARTMENT OF AGRICULTURE

The present State Department of Agriculture is the modernization of the old Department which was created in 1889. At that time, the Department of Agriculture included the Department of Labor.

The Department is organized into nine divisions and currently employs a total staff of 26 people, a rather small number in comparison to the fact that 80 percent of the state income is derived from agriculture.

The state responsibility for pesticides resides with the Pesticide and Noxious Weeds Division.

NORTH DAKOTA STATE DEPARTMENT OF HEALTH

The State Department of Health was created in 1889. By 1947, a State Health Council had been created and today is composed of eleven members appointed by the Governor.

State law has created, within the Department, sixteen divisions which are divided across three areas: Public Health; Environmental Control; and, Mental Health & Retardation.

Most environmental control programs within the state are under one organizational structure, the Environmental Control Section of the Department. Environmental programs of the Department date back to 1938. The major mission of this section of the Department is to protect and to enhance the environment of the State of North Dakota.

Overall the agency has experienced a 25% increase in staff since 1975 and expects to sustain an average 8% to 10% increase per annum over the next few years.

STATE OF NORTH DAKOTA

DEPARTMENT OF HEALTH

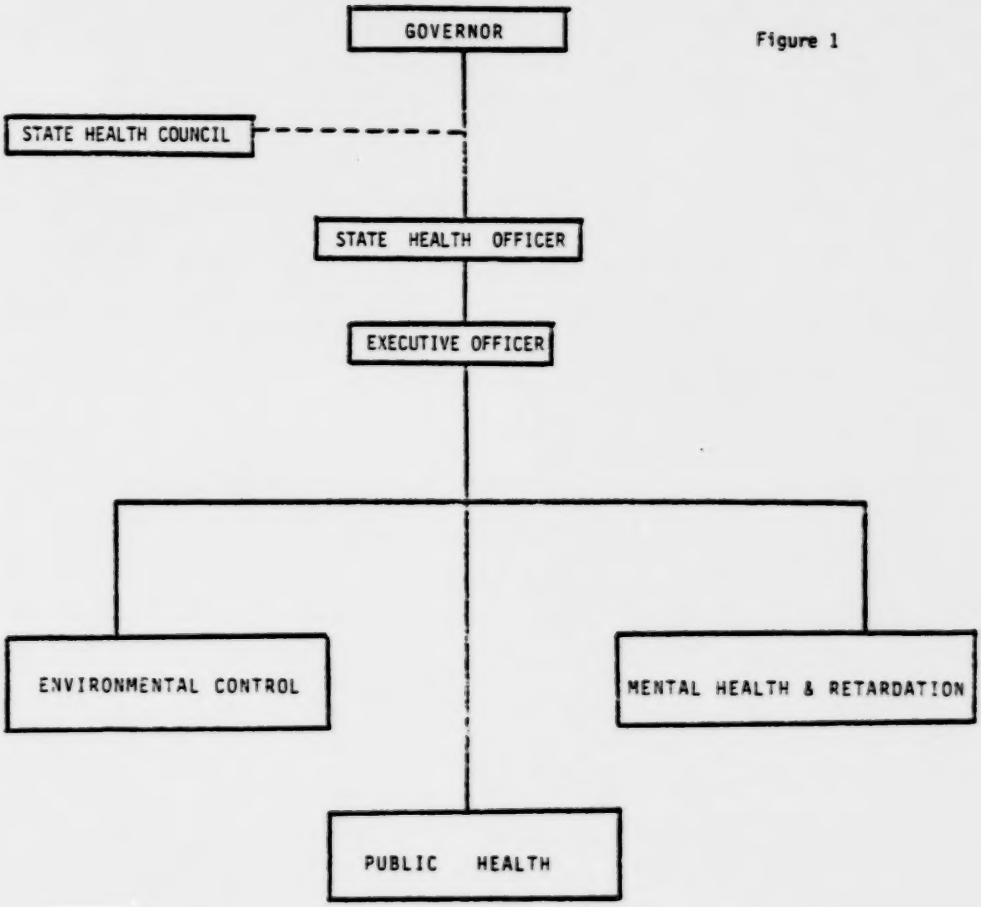


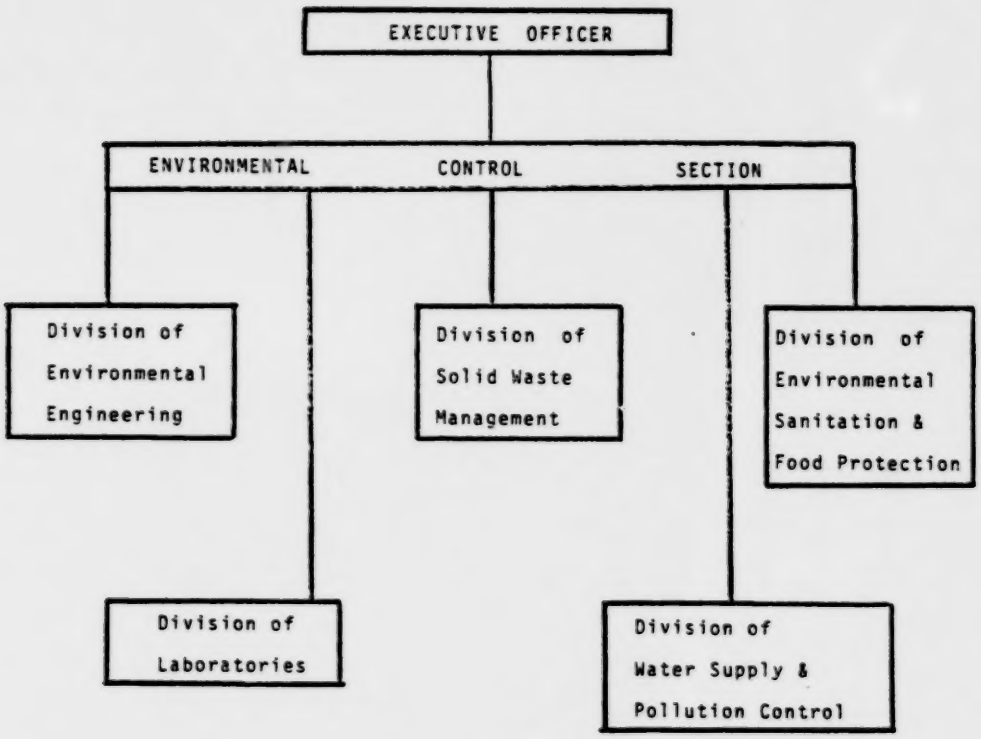
Figure 1

STATE OF NORTH DAKOTA

DEPARTMENT OF HEALTH

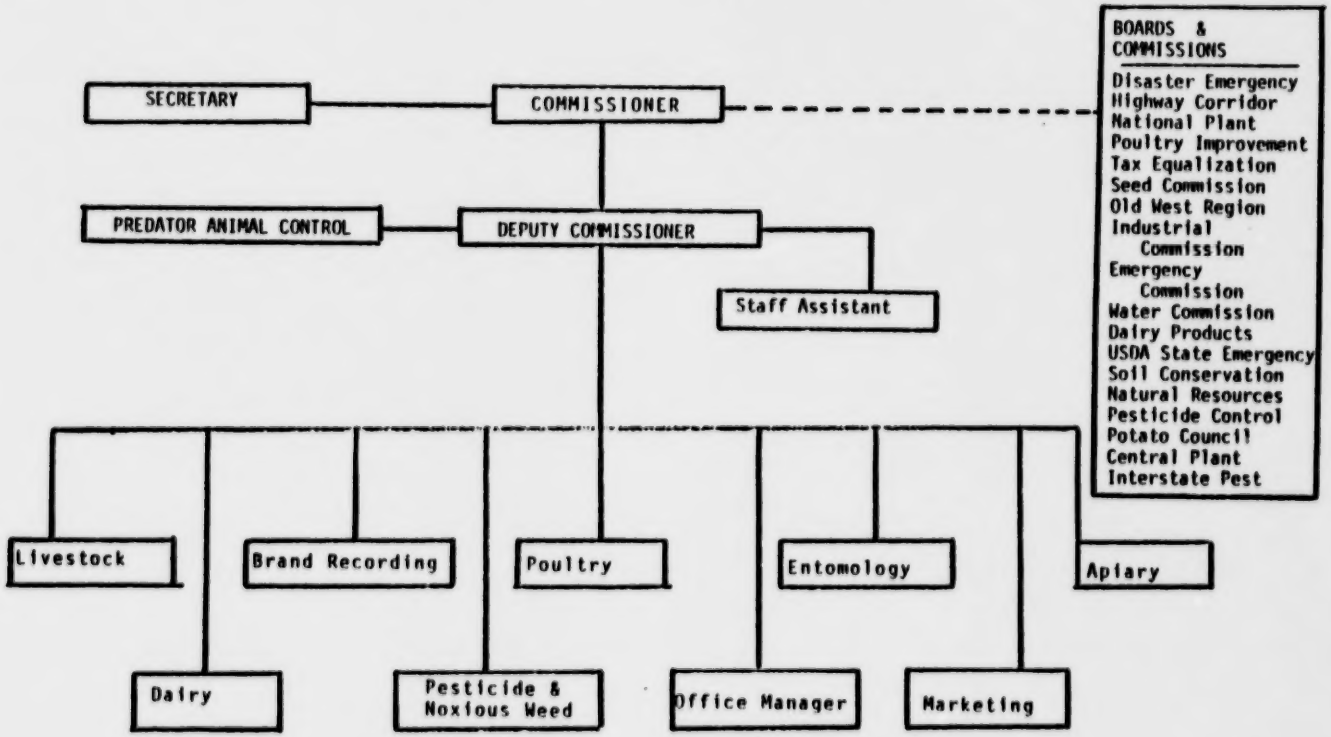
ENVIRONMENTAL CONTROL SECTION

Figure 2


EXECUTIVE OFFICER
ENVIRONMENTAL CONTROL SECTION
Division of Environmental Engineering
Division of Solid Waste Management
Division of Environmental Sanitation & Food Protection
Division of Laboratories
Division of Water Supply & Pollution Control

STATE OF NORTH DAKOTA

Figure 3 DEPARTMENT OF AGRICULTURE



Pollution Control and Abatement Programs

I. AIR

A. Introduction

Air quality problems in North Dakota are not extensive. The air can be described as relatively clean, although effects of air pollution have been identified in certain areas of the state.

In compliance with the U.S. Environmental Protection Agency (EPA) two Air Quality Maintenance Areas (AQMA) were defined: the Cass AQMA, identified for particulate matter; and, the McLean-Mercer-Oliver AQMA which was identified for particulate matter, sulfur dioxide, nitrogen dioxide and photochemical oxidants. Subsequently, the state submitted a detailed Air Quality Analysis for these areas. This analysis demonstrated that the North Dakota State Implementation Plan (SIP) would be adequate to provide for maintenance of standards in the Cass AQMA and the McLean-Mercer-Oliver AQMA.

B. Workforce Profile

The North Dakota Department of Health, Environmental Control Division administers the air pollution control and abatement programs across the state, through the Air Quality Program. Chapter 23-25 of the North Dakota Century Code grants statutory authority for the air pollution control program activities. Acting in an advisory capacity is an Air Pollution Control Advisory Council.

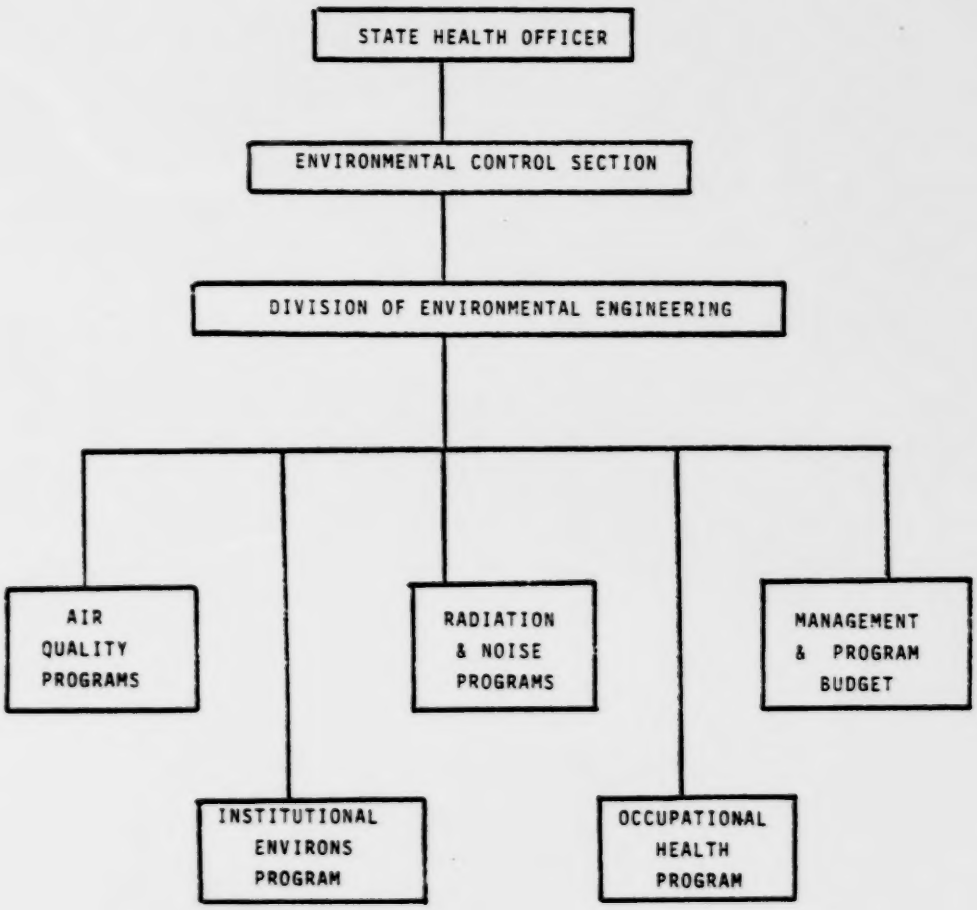
The Air Quality Program consists of two major components as depicted on the following pages in the organizational chart. The components are:

NORTH DAKOTA DEPARTMENT OF HEALTH

ENVIRONMENTAL CONTROL SECTION

DIVISION OF ENVIRONMENTAL ENGINEERING

Figure 4



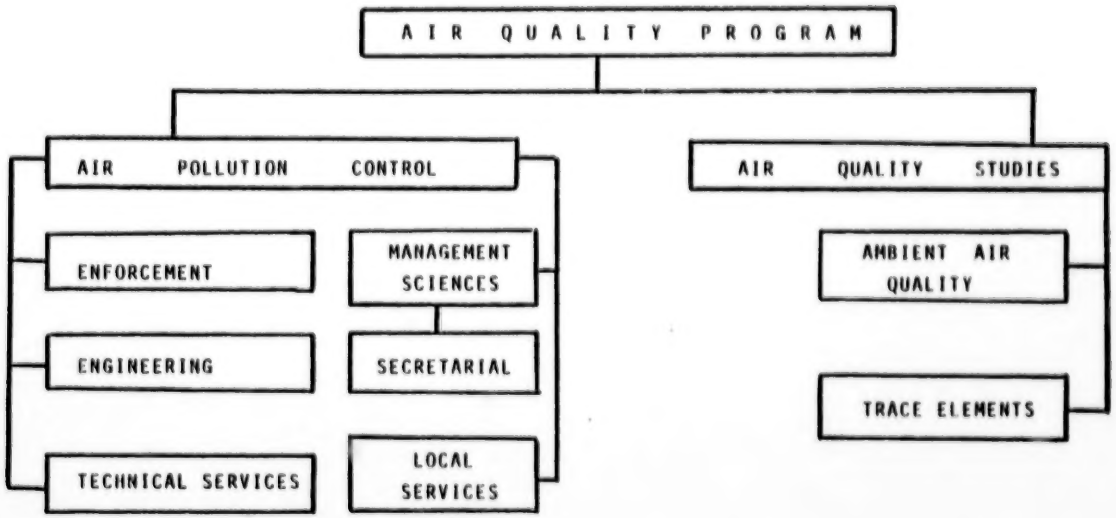
STATE OF NORTH DAKOTA

DEPARTMENT OF HEALTH

ENVIRONMENTAL CONTROL SECTION

DIVISION OF ENVIRONMENTAL ENGINEERING, AIR QUALITY PROGRAM

Figure 5



(1) air pollution control, and (2) air quality studies. The air pollution control wing of the Program consists of five sections. Three of these sections, enforcement, engineering and technical services, are supported on a fifty-fifty basis with the U.S. Environmental Protection Agency (EPA). These three sections along with local services section are the operational arm of the program. Permit review, inspection activities, operation of air sampling network which includes eight stations located in western North Dakota, and public relations activities are all major responsibilities of the Air Quality Program.

Under the air quality studies wing of the Program, two projects are currently being conducted. The ambient air quality study consists of a regional environmental impact statement analysis and review project entitled, Regional Environmental Assessment Project (REAP). Trace elements is a project whicn is funded by the Old West Regional Commission. The Old West Regional Commission presents a vehicle through which regional problem areas may be examined. These studies ordinarily would not be conducted due to inadequate funding were the Commission to not contribute for their undertaking.

The following table details the current (1976) staffing levels of the Air Quality Program. The turnover rate for this program is quite low.

TABLE I

NORTH DAKOTA DEPARTMENT OF HEALTH

Environmental Control Section
Division of Environmental Engineering
Air Quality Program
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Program Director	1	0%
Environmental Engineer	6	2%
Meteorologist	1	0%
Chemist	8	1%
Sanitarian	3	2%
Lab Technician	5	3%
Research Analyst	1	2%
Public Health Executive	1	0%
Secretarial	4	N/A
TOTAL	30	2%

Although no firm figures are available at this time, state personnel estimate that the statewide workforce in air pollution control and abatement is exceedingly small.

C. Workforce Projections

The air pollution control and abatement field in North Dakota is a difficult area to project workforce requirements over the next three to five years. Staffing increases will occur at the state level and due to lignite coal extraction and other energy development related factors, the private sector should experience growth also. The table following details the anticipated changes in staffing patterns on the state level. The private sector should experience a two percent per annum increase to 1982.

TABLE II

NORTH DAKOTA DEPARTMENT OF HEALTH

Environmental Control Section
Division of Environmental Engineering[1]
Air Quality Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Program Director	1	1	1	1	1	1	0%	0%
Environmental Engineer	6	6	6	7	7	7	2%	3%
Meteorologist	1	1	1	2	2	2	0%	20%
Chemist	8	8	8	8	9	9	1%	3%
Sanitarian	3	3	3	3	3	3	2%	0%
Lab Technician	5	5	5	5	5	5	3%	0%
Research Analyst	1	1	1	1	1	1	2%	0%
Public Health Executive	1	1	1	1	1	1	0%	0%
Secretarial	4	4	4	4	4	4	N/A	0%
TOTAL	30	30	30	32	33	33	2%	2%

[1] Includes laboratory personnel.

D. Training and Certification

Training and educational activities are available within a varied framework. The Program Director encourages generalized education of the citizenry regarding air quality. Therefore, most staff members, within time limitations, make every effort to comply with requests for public information. These requests may take the form of formal public addresses to civic organizations or the more informal discussion groups with schools and other groups. Distribution of informational documents such as data summaries, copies of rules

and regulations and air pollution pamphlets is also a major portion of the program to involve the people of the state in matters pertaining to air quality.

North Dakota has a smoke generator and maintains a staff to facilitate its own Smoke School. Smoke readers must be recertified at six-month intervals. It is anticipated that the North Dakota Smoke School will become a regional center for training and certification of personnel from North Dakota and the surrounding states.

The following details the training and certification efforts within the Air Quality Program for the last year.

TABLE III

STATE OF NORTH DAKOTA

Air Training

SPONSOR	LENGTH	PROGRAM	NUMBER TRAINED
U.S. EPA	4 days	Control of Particulate Emissions	2
U.S. EPA	4 days	Control of Gaseous Emissions	1
U.S. EPA	3 days	Air Pollution Field Enforcement	2
U.S. EPA	4 days	Source Sampling for Particulate Emissions	2
U.S. EPA	3 days	Quality Assurance for Air Pollution Measurement Systems	1
U.S. EPA	2 days	Visible Emissions Recertification	2

TABLE III

(continued)

SPONSOR	LENGTH	PROGRAM	NUMBER TRAINED
U.S. EPA	4 1/2 days	Diffusion of Air Pollution; Theory and Application	1
U.S. EPA	Self-instruction	Effective Stack Height/ Plume Rise	1
U.S. EPA	Self-instruction	Air Pollution Control Orientation	1
U.S. EPA	*	Stack Test Observation Workshop	3
U.S. EPA	*	Environmental Impact Statements & Public Relations	1
Minnesota Pollution Control Agency	2 days	Visible Emissions	1
University of Minnesota	2 days	Air Pollutants: Their Effects on Human Health & Welfare	2

Currently the Air Quality Program has 10 staff members who are taking "Air Pollution Meteorology" for credit from Colorado State University in Fort Collins, Colorado. The Department of Health is supporting this effort through tuition payments. The participants are able to take advantage of this course on their lunch hour as it is video taped.

Overall, the training efforts in North Dakota are quite extensive. The training of other regional personnel at Smoke Schools will be an increasing occurrence for North Dakota.

E. Career Potential

Limited career opportunities, particularly at the degreed level, will be available in North Dakota over the next three to five years. The level to which these positions will occur, is, of course, dependent on legislative mandates, e.g., new amendments to the Clean Air Act, and the stringency of any related enforcement activities. However, given what might be termed normal operating procedures, staff growth will create positions for meteorologists, health and sanitary engineers, air analysts, automobile mechanics skilled in emission controls, smoke testers and industrial hygienists.

F. Conclusion

The State of North Dakota will be faced with ever increasing challenges in the area of air pollution control and abatement. The effects of energy resource development within the state will be manifested in various ways, only one of which will be air quality problems.

The workforce profile, although projected in conservative terms, will likely experience substantial growth. Evidence indicates the emergency of possible new career options related to air pollution control and abatement as a direct result of forthcoming energy resource development throughout North Dakota and neighboring states.

Today, as in the past, the Air Quality Program strives to correct existing air pollution problems in North Dakota. As these problems are brought under control, increasing emphasis will be place on the prevention of potential problems.

II. NOISE

A. Introduction

Noise pollution control and abatement is currently being accorded a greater emphasis in North Dakota than in many of the surrounding Rocky Mountain Prairie states. An environmental noise regulation is in the process of being prepared. This would afford the state the necessary authority to administer a state noise law. North Dakota personnel feel the primary need for noise reglated legislation lies in the prevention of potential noise problems. As a consequence, enforcement tools will be available.

Problems associated with energy extraction and conversion as well as other non-agricultural activities describe the near-future emphasis for noise pollution control and abatement in North Dakota.

B. Workforce Profile

A limited number of personnel are involved in the field of noise pollution control and abatement in North Dakota. The state administers a program through the Department of Health, Environmental Control Section, Division of Environmental Engineering. The program is directed by the Division Chief and is allocated one full-time equivalent professional person with minor secretarial support. The advantages to including the state noise program within the Division of Environmental Engineering are manifested in the availability of technical expertise.

The North Dakota Department of Health program is divided into two major components: (1) noise control; and, (2) community noise. Personnel are interchangeable between the two sections.

The state staff, through the Department of Health, perform field investigations in response to noise complaints. The review of Environmental Impact Statements (E.I.S.) is another major responsibility.

Current workforce figures for the statewide personnel are not readily available. On the local level the efforts generally are assigned to law enforcement personnel.

The table below details the municipal noise regulations across North Dakota.

TABLE IV

STATE OF NORTH DAKOTA

Municipal Noise Ordinances (1975)

COMMUNITY		ORDINANCE								TOTAL		
		Aircraft	Building	Construction	Nuisance	Railroad	Vehicle	Rec./Vehicle	Zoning	a	b	
Bismarck					b					0	1	1
Total	(a)	0	0	0	0	0	0	0	0	0		
	(b)	0	0	0	1	0	0	0	0	0	1	1

KEY: a = regulation includes acoustical criteria;
b = regulation does not include acoustical criteria.

SOURCE: Sound & Vibration, December, 1975. Clifford R. Bragdon, Contributing Editor.

C. Workforce Projections

With the current workforce at such a minimal level, increases in staff are almost assured. A two percent per annum increase and a realignment of staffing levels should occur to 1982. Those persons who currently allocate time to several responsibilities other than noise control may be assigned full-time to this emerging area as time progresses.

D. Training and Certification

Most of the training for the field of noise pollution control and abatement is available outside of North Dakota. Certification is presently not an option. However, as the noise problems related to energy development are explored and defined, training will be needed and possibly certification will become a result of the process, especially at the less than degreed level.

E. Career Potential

There is little evidence that a significant number of career opportunities will develop in North Dakota over the next five years. The current workforce is quite limited and on the local level only partial effort is allocated to noise control on the part of most personnel. Environmental engineers in both industry and the public sector may be assigned noise pollution control and abatement duties. New and unique job categories will most likely not emerge over the next five years.

F. Conclusion

The present noise control activity in North Dakota may be defined as minimal. However, the state, along with Colorado and several other energy impacted states, has been awarded a $15,000 grant from the U.S. Environmental Protection Agency (EPA). This grant money will be utilized to study noise problems related to energy-impacted communities over a twenty-six month period. This study will assist energy-impacted or potentially impacted communities in the drafting of ordinances. Technical assistance is a major component of this study. The state will assist and instruct local personnel in the use of the highly sensitive equipment which may be utilized by the community. Every effort will be made to lend support to the community level in the establishment of local programs.

The workforce will be affected by this study to some extent. Full-time noise personnel will emerge where previously these responsibilities and activities were assigned in addition to usual duties.

III. PESTICIDES

A. Introduction

North Dakota is predominately an agriculturally based state. Yet, the Department of Agriculture maintains a total staff of 26 people. In 1975, the major responsibility for the state Pesticide Act was delegated to the Department. Recently a Pesticide Division was added. This Division is charged to provide administrative and technical direction in the enforcement of state laws which regulate the application of restricted use pesticides as defined by the U.S. Environmental Protection Agency. The pesticides related problems have not been extensive nor severe in North Dakota. The establishment of the Pesticide Division, however, was in response to a need to define responsibility for training and applicator certification pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended.

The North Dakota Pesticide Act of 1975 defines the distribution, storage, transportation, use, application and disposal of pesticides and pesticides devices. The Act further provides for the examination and licensing of materials and dealers. Commercial applicators utilizing restricted use pesticides must be certified under the Act.

The North Dakota Act provided for the creation of the Pesticides Control Board. This board administers the provisions of the Act and promulgates rules and regulations necessary to the purpose of the Act.

B. Workforce Profile

The Pesticide Division is currently in the process of assessing the state regarding problems, training, and certification of restricted-use applicators. The present staffing levels are depicted in the following table.

TABLE V

STATE OF NORTH DAKOTA

Department of Agriculture
Pesticides Division
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Division Director	1	0%
Commissioner*	1	N/A
Deputy Commissioner*	1	N/A
Program Developer*	1	**
Secretarial	1	N/A
TOTAL	5	N/A

* half-time or less
** unavailable.

The statewide workforce is divided into two major categories: commercial applicators and private applicators. Commercial applicators are specifically identified as may be seen in the following table.

TABLE VI

STATE OF NORTH DAKOTA

Current (1976) Pesticides Staffing Level (est.)

Category		1976	%/annum turnover (average)
Commercial Applicators		3,343	10%
Agricultural Pest Control			
Plant	1,565		
Animal	235		

TABLE VI

(continued)

Category	1976	%/annum turnover (average)
Ornamental & Turf Pest Control	150	
Seed Treatment	600	
Right-of-way Pest Control	130	
Industrial, Institutional, Structural & Health Related Pest Control	35	
Public Health Pest Control	75	
Demonstration & Research Pest Control	183	
Regulatory	20	
Dealers	350	
Private Applicators	9,460	N/A
TOTAL	12,803	N/A

There are 37,090 farmers in North Dakota. Potentially all of these might become certified. However, the Department estimates that approximately 8,420 to 10,500 will require certification. The majority of pesticides (80%) which are now applied in North Dakota are not defined as restricted use. The department regionally defines those farmers utilizing restricted use chemicals as being located almost exclusively in the valley of the eastern part of the state.

Additional pesticides personnel, depicted on the table below, are included within agencies or institutions as follows:

North Dakota Aeronautics Commission, (one person): This person is responsible for licensing each aircraft which will be utilized in aerial spraying. Until October 1976, the responsibility for certifying aerial applicators will be allocated to the commission.

North Dakota State Health Department, (three persons): These personnel are responsible for food protection and air quality.

North Dakota State University, Agricultural Experiment Station, (two persons): The University is represented on the Pesticide Control Board.

North Dakota State Laboratories, (11 persons): These personnel are responsible for state product registration and inspection of pesticide retail establishments.

North Dakota State University Cooperative Extension Service, (55 persons): The county Extension Agents are responsible for training.

TABLE VII

STATE OF NORTH DAKOTA

Pesticides Personnel Other Than Applicators
Current (1976) Staffing Level
(estimated)

Position	1976	%/annum turnover (average)
Agency Director	5	N/A
Assistant Director	1	N/A
Entomologist	1	N/A
Chemist	1	N/A
Engineer	2	N/A
Inspector	9	N/A
County Agent	53	N/A
TOTAL	72	N/A

C. Workforce Projections

The North Dakota Department of Agriculture, Pesticides Division staff should experience an increase in workforce for the next three years.

Subsequent to this growth the staffing levels will illustrate no increases to 1982. Departmental personnel express the belief that the division might be assimilated into other program areas if pesticides activities in North Dakota decrease in the early 1980s.

The following table details projected workforce requirements to 1982 for the Department of Agriculture.

TABLE VIII

STATE OF NORTH DAKOTA

Department of Agriculture
Pesticides Division
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Division Director	1	1	1	1	1	1	0%	0%
Commissioner	1*	1*	1*	1*	1*	1*	N/A	0%
Deputy Commissioner	1*	1*	1*	1*	1*	1*	N/A	0%
Program Developer	1*	1	1	1	1*	1*	**	0%
Plant Pathologist	0	1	1	1	1	1	**	20%
Pesticide Inspector[1]	0	4	4	4	4	4	N/A	20%[2]
Secretarial	1*	2	2	2	2	2	N/A	20%
TOTAL	5	11	11	11	11	11	N/A	8%[3]

* half-time or less
** unavailable

[1] 4 part-time hired for 3 months each = 1 full-time equivalent.

[2] computed as one person = 100% over 5 years = 20%/annum.

[3] utilizing full-time-equivalent figure for #2.

Few changes relative to workforce size occur within the applicator ranks. The State Employment Security Bureau estimates that the number

of farmers across the state will decrease to approximately 33,140 by 1982, approximately 2.6% per annum. The table below reflects this anticipated decrease in the private applicator category.

The commercial applicator category will experience minimal percentage changes in number of applicators. The number of pesticide control firms most likely will not increase. Rather individual firms will exhibit slight expansion.

TABLE IX

STATE OF NORTH DAKOTA

Pesticides Personnel - Applicator & Non-Applicator
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Commercial Applicator	3343	3376	3409	3409	3409	3443	10%	1%
Private Applicator	9460	9318	9178	9040	8904	8770	N/A	-1.5%
Inspector	9	9	10	10	11	11	*	4%
County Agent	53	53	53	53	53	53	*	0%
Other**	10	10	11	11	12	12	*	4%
TOTAL	12875	12766	12661	12523	12389	12289	N/A	-1%

* unavailable
** Entomologist, Chemist, Engineer, Administrators.

As may be seen from the above table, an overall decline in applicator and non-applicator pesticide personnel should occur to 1982.

D. Training and Certification

As in other states, pesticides personnel are developing training courses and materials for commercial and private applicators. The major responsibility

for applicator training has been allocated to the North Dakota State University Cooperative Extension Service, County Extension Agents. The 53 County Agents will be conducting training within their respective areas of responsibility.

Training for commercial applicators will take the form of two-day seminars conducted by County Agents. These two-day training sessions will be strategically located across the state. Pursuant to the North Dakota State Pesticide Plan, (May, 1976) "all commercial applicators shall demonstrate knowledge of the principles and practices of pest control and safe use of pesticides. Testing shall be based on examples of problems and situations appropriate to the particular category or subcategory of the applicator's certification . . ."[1] The commercial applicator will demonstrate competency by satisfactorily completing a written examination.

The private applicator will not be required to pass a written examination. If a person lacks readying skills, arrangements will be made to test those individuals orally. In accordance with the North Dakota State Pesticide Plan, (May, 1976) "a private applicator must possess a practical knowledge of the pest problems, pest control practices, and integrated pest management associated with his agricultural operations, proper storage, use, handling, and disposal of the pesticides and containers, and his related legal responsibility."[2]

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[1] North Dakota Department of Agriculture, Pesticide Control Board, North Dakota State Pesticide Plan, Bismarck, May 30, 1976, pg. 11.

[2] Ibid., pg. 17.

Private applicators may be trained by several methods. Seminars of two to four hours will be conducted across the state by County Extension Agents. The applicator may also utilize an auto-tutorial instruction, a two- to four-hour package available at the Office of the County Extension Agency. A self-study home study course will also be available. The training for private applicators will be a new program as North Dakota currently does not have training for the private applicator desiring certification.

E. Career Potential

Career opportunities at the state level will be limited over the next three to five years. Job openings will be more numerous at the applicator level. The applicator category is usually marked by a high turnover rate. Many of these jobs are seasonal in nature and characterized by meager salaries and lack of upward mobility.

F. Conclusion

Pesticides problems are not extensive in North Dakota. Employment opportunities in both the private and public sector are competitive at present and will continue to be so for several years.

Integrated Pest Management (IPM) may play a larger role in future pesticides programs. The demand for IPM trained personnel may increase slightly statewide as the department and the farmers evaluate these program options for North Dakota. At present, pesticides staff members of the department feel IPM programs would be difficult to utilize in North Dakota.

At present, the Department of Agriculture has contacted Tribal Council Chairpersons of the four Indian reservations in the state regarding training and certification of applicators. To date, no agreements have been made.

IV. POTABLE WATER

A. Introduction

Overall drinking water quality and quantity in North Dakota has been described as good. Water problems related to consumption are neither as extensive nor as numerous as in many western states. The Lake and Reservoir Assessment, Cogger, Payne, and Sprenger, U.S. Environmental Protection Agency Region VIII, August 1976, lists two sources of drinking water supply: Fish Lake and Patterson Reservoir (Dickinson Dam). Nine other lakes and reservoirs were also included within this study in North Dakota. The state, however, does not classify most lakes and reservoirs, and this study addressed conditions other than uses of lakes and reservoirs for drinking water purposes.

North Dakota lignite and other energy resource development, impacts the quantity as well as the quality of the state's waters. Energy development, however, in most cases does not affect the drinking water supply demands to nearly the same degree as wastewater treatment.

B. Workforce Profile

The North Dakota Department of Health has allocated responsibility for potable water to the Division of Water Supply & Pollution Control. Information for the workforce profile was obtained through on-site and telephone interviews with personnel from the department and the division.

The table below details the current workforce for the Division of Water Supply and Pollution Control, potable water staff. The responsibilities of the division relative to drinking water include:

- review and approval of plans and specifications for additions or modifications to all industrial and municipal water facilities;
- inspection of municipal and private water systems as well as fluoridation facilities and interstate watering points;
- training of water treatment and distribution plant operators; and,
- sampling of drinking water supplies.

TABLE X

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Water Supply & Pollution Control*
Current (1976) Staffing Level - Potable Water

Position	1976	%/annum turnover (average)
Environmental Engineer	4	1%
Microbiologist	1	1%
Chemist	1	1%
Secretarial	1	N/A
TOTAL	7	N/A

* includes laboratory personnel.

The above table includes personnel from the State Laboratory. The laboratory is described as a consumer protection agency and currently has a total staff of 36 full-time employees. Laboratory personnel are located in Grand Forks and Bismarck. The services include a wide range of activities and environmental testing is only one facet. During the last reporting period (biennium July 1, 1973 to June 30, 1975) 16,145 water bacteriological tests were conducted, along with 7,196 chemical water tests.

The following table details the current status of certified water treatment and supply plant operators in North Dakota, as reported by the Department of Health.

TABLE XI

NORTH DAKOTA WATER TREATMENT & SUPPLY PERSONNEL

Current (1976) Staffing Level

Class	1976	%/annum turnover (average)
I (lowest)	122	15%
II	45	13%
III	38	10%
IV	23	3%
TOTAL	228	10.2%

C. Workforce Projections

Workforce projections are based on the best professional judgements of personnel at the Department of Health. Information was obtained through on-site and telephone interviews.

The following table depicts the estimated workforce requirements for potable water personnel within the Department of Health to 1982. The turnover rate is anticipated to remain very low.

TABLE XII

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Water Supply & Pollution Control**
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Environmental Engineer	4	5	5	5	5	5	1%	5%
Microbiologist	1	2	2	2	2	2	1%	20%

TABLE XII

(continued)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Chemist	1	1	1	1	1	1	1%	0%
Sanitarian	0	1	1	1	1	1	*	20%
Secretarial	1	2	2	2	2	2	N/A	20%
TOTAL	7	11	11	11	11	11	N/A	11.5%

* unavailable
** includes laboratory personnel.

The following projections for certified operators to 1982 are the result of a compilation of estimates by Department of Health personnel.

TABLE XIII

NORTH DAKOTA WATER TREATMENT & SUPPLY PERSONNEL

Certified Operators
Workforce Projections to 1982 (est.)

Class	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
I	122	134	147	161	177	194	15%	10%
II	45	47	49	51	53	56	13%	4%
III	38	39	40	41	42	43	10%	3%
IV	23	23	24	24	25	25	3%	2%
TOTAL	228	243	260	277	297	318	10.2%	7%

The projected per annum growth of operators, then, is 7% overall. As seen in the above table, entry level growth will be somewhat higher with an average per annum increase in workforce of 10%.

D. Certification and Training

Training for certification and upgrading of operators is conducted throughout the year by means of several options. The Division of Water Supply and Pollution Control in conjunction with the Division of Environmental Engineering and the North Dakota State University conduct a one-week school for operators on the campus of the University at Fargo. The curriculum consists of remedial math and science and the specifics of water treatment and plant operation.

Ordinarily a federal training grant is received by the Department of Health each year. This money is allocated to training of operating and supervisory personnel and consists of one-day sessions per week for twelve weeks. The material covered within this course framework is the same as that presented during the week-long school. However, it is presented in more detail.

The training of operators has had an annual attendance history of 81 in 1974 and 107 in 1975. This figure included wastewater treatment plant operators, however. This reflects a per annum increase of 30% in participants. It is estimated, therefore, that 139 operators (water and wastewater) were trained during 1976. Approximately 69 of these (50%) may be estimated to have been water treatment and distribution plant personnel.

The certification examination is given twice each year, once in Fargo after the annual week-long school and once again after the annual meeting of the Water and Wastewater Conference.

E. Career Potential

Career opportunities will be available from the degreed to the non-degreed levels. The availability of jobs in the drinking water field will be lessened should the state not assume primary enforcement responsibility for the Safe Drinking Water Act.

F. Conclusion

To protect the individual citizen as well as the community and to provide protection against inadequate and improperly designed water supply systems is the overall gaol of the Department of Health potable water personnel. Changes in water availability as well as in quality will occur due to increased energy resource extraction, especially North Dakota lignite.

The State of North Dakota has indicated intentions of assuming primary responsibility for the Safe Drinking Water Act. This undoubtedly will affect the workforce profile as increased monitoring, sampling, and reporting will be necessary.

The greatest area of workforce need is in water treatment and distribution plant operating and supervisory personnel. This is the result of more strict enforcement of existing regulations, new treatment methods, and increased technologies.

V. RADIATION

A. Introduction

The major responsibility for radiation control in North Dakota has been allocated to the Department of Health, Environmental Control Section, Division of Environmental Engineering. Statutory authority for the radiation program is found in Section 23-20-03 through 23-20-06 of Chapter 23-20 and Section 23-20.1-01 through 23.20.1-11 of Chapter 23-20.1 of the North Dakota Century Code. The health and safety of the public and the protection of the radiation user are the primary goals of the state program. The program oversees the development and utilization of sources of ionizing and non-ionizing radiation while protecting the citizenry of the state.

B. Workforce Profile

The radiation control program in North Dakota encompasses several major areas. Currently the staff is revising the radiological health regulations. X-ray machines in the state are registered, inspected, and re-registered at three-year intervals. There are approximately 412 facilities registered with the state. An increasing problem for the Department of Health staff is the shortage of personnel to conduct X-ray inspections. The Department has stated its belief that a large percentage of these machines are not in compliance with the radiological health regulations.

The following table details the current workforce of the Department of Health. The radiological program has been combined with the noise

program. An organizational chart depicting the radiation control program exclusively is presented on the following page.

TABLE XIV

NORTH DAKOTA DEPARTMENT OF HEALTH

Environmental Control Section
Division of Environmental Engineering
Radiation Control Program
Current (1976) Staffing Level *

Position	1976	%/annum turnover (average)
Environmental Engineer	2	3%
Public Health Executive	1	3%
Secretarial	1	N/A
TOTAL	4	N/A

* rounded-off to nearest whole.

The state personnel have indicated that approximately 700-900 people are occupationally exposed to radiation in North Dakota. These include medical, dental, veterinary, and training facilities personnel. The following table describes the statewide workforce for radiation control.

TABLE XV

STATE OF NORTH DAKOTA

Radiation Control Personnel
Current (1976) Staffing Level (estimated)

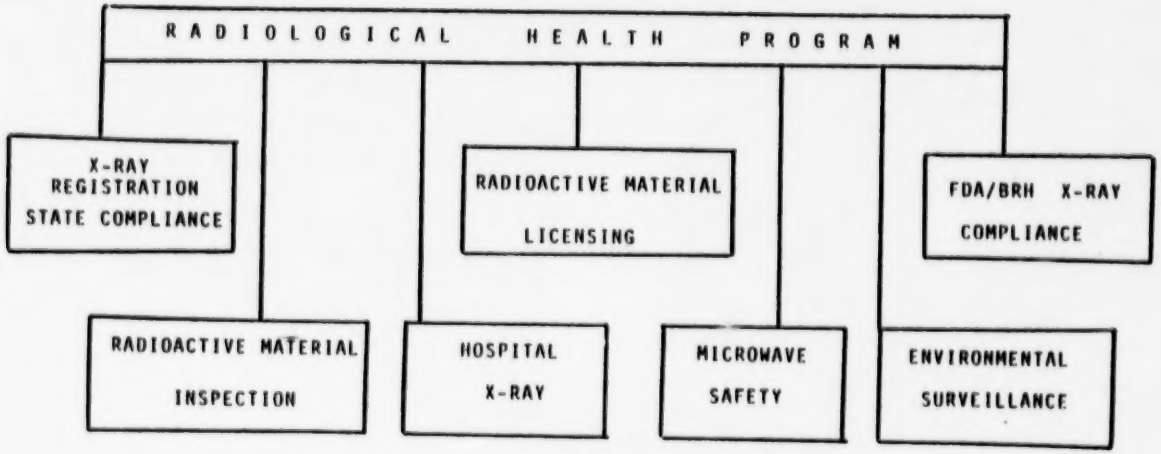
Position	1976	%/annum turnover (average)
Radiologic Technologist	190	8%
Medical/dental/veterinary	700	10%
Radiation Safety Officers	80	5%
Other	10	N/A
TOTAL	980	N/A

N O R T H D A K O T A

DEPARTMENT OF HEALTH, ENVIRONMENTAL CONTROL SECTION

DIVISION OF ENVIRONMENTAL ENGINEERING

Figure 6 Radiological Health



The category "Other" in the preceding table includes miscellaneous radiation control personnel mostly associated with federal installations.

C. Workforce Projections

The workforce necessary for the radiation control program of the Department of Health will experience increases over the next three to five years. If increased uranium-related activities should occur within the state, the figures depicted below would require upward adjustment.

TABLE XVI

NORTH DAKOTA DEPARTMENT OF HEALTH

Environmental Control Section
Division of Environmental Engineering
Radiation Control Program
Workforce Projections to 1982 (est)

Position	1976*	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Environmental Engineer	2	2	3	3	3	3	3%	10%
Public Health Executive	1	1	1	1	1	1	3%	0%
Secretarial	1	1	1	1	1	1	N/A	0%
TOTAL	4	4	5	5	5	5	N/A	5%

* rounded-off to nearest whole number.

The following table presents the workforce requirements 1976-1981 for statewide persons working in the radiation control field. These figures, as well as those in the preceding table, are the result of judgements of professionals in the field.

TABLE XVII

STATE OF NORTH DAKOTA

Radiation Control Personnel
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Radiologic Technologist	190	194	198	202	206	210	8%	2%
Medical/ dental/ veterinary	700	714	728	744	759	774	10%	2%
Radiation Safety Officers	80	82	84	86	88	90	5%	2%
Other	10	10	10	10	11	11	N/A	2%
TOTAL	980	1000	1020	1042	1064	1095	N/A	2%

D. Training and Certification

Most training of X-ray personnel is corrective in nature and is accomplished during on-site inspection visits by state personnel. To date, there are no minimum education, training or experience standards for persons applying ionizing radiation to human beings for diagnostic or theraputic purposes. This is not unusual as currently there are only nine states which have enacted such requirements.

As in other environmental areas, the state personnel attempt to respond to all requests for information and education of the public at large as to radiation health hazards.

The Nuclear Regulatory Commission (NRC) conducts seminars and training courses at various locations across the country. When possible, with the Departmental constraints of time, state personnel attempt to attend and participate in these course offerings.

E. Career Potential

Career potentials within the field of radiological health appear to be good over the next three to five years. The State of North Dakota will increase the workforce effort allocated to radiation control if uranium development increases. The widest range of career opportunities which will be available over the next five years will be on the degreed level. The private sector will require specialized areas of expertise in addition to radiation and nuclear-related skills. Environmental Impact Statement (E.I.S.) expertise will become increasingly marketable in North Dakota and energy resources are developed.

F. Conclusion

The major emphasis of the Radiation Control Program has shifted from the medical/dental area to licensing and inspection of radioactive materials users. The State of North Dakota is an "Agreement" state. This refers to an agreement between the Nuclear Regulatory Commission (NRC) and the state. Under the terms of this agreement, certain of the Commission's responsibilities are transferred to the state under Section 274 of the Atomic Energy Act of 1954. The North Dakota Radiation Control Program licenses radioactive material users and must perform inspections at least every two years. Currently, in North Dakota there are 77 licenses; two are NRC licenses, while 75 are agreement state licenses.

With an increase in nuclear-related activities across the state (i.e., establishment of nuclear power reactors, etc.) and resumption and increases of uranium development, radiation control personnel will be

required at the degreed level and above. It appears likely that new career options may surface in North Dakota as radiation control becomes an important component of the state's future society.

VI. SOLID WASTE

A. Introduction

Solid waste management is not a new program in North Dakota. In 1966 the Governor appointed the Department of Health as the lead agency to develop a solid waste management plan for North Dakota, under Section 206 of Public Law 89-272, Title II. The plan was approved in 1971. In 1975, the Solid Waste Management and Land Protection Act was enacted, and the authority to promulgate rules and regulations was given to the North Dakota Department of Health. Subsequently, in the same year, the Department created the Division of Solid Waste Management.

North Dakota has little heavy industry and, therefore, the disposal of industrial hazardous waste products has not been a large problem. North Dakota is an agriculturally based state, however. As such, pesticides, herbicides and various other compounds utilized in agricultural activities are present in the state and do require a burial or disposal site. Add the hazardous waste substances from military installations as well as from the scientific laboratories of the universities and colleges and the problem of disposal is compounded. To date, there is no commercial hazardous waste site in the state, and these materials have been stored or shipped out of state.

B. Workforce Profile

The purpose of the Solid Waste Management and Land Protection Act is to plan for and to regulate the storage, collection, transportation, and

disposal of solid wastes. The Act was established to protect the safety, welfare and health of the citizenry of North Dakota. To these ends, the Division of Solid Waste Management is attempting to establish zone, area or county collection systems, statewide. The ever increasing costs of equipment and labor has caused many of the small communities of North Dakota to band together in such arrangements. Individually it is not feasible for these communities to endeavor to support a sanitary landfill. Yet, the majority of the state's landfills are public owned and operated. According to Solid Waste Systems, October/November, 1976, 45 (90%) of these landfills are public as compared to five (10%) which are private.

Information for the workforce profile and the workforce projections was obtained through on-site, telephone and mail interviews with Solid Waste Management Division personnel.

The following table describes the current Department of Health solid waste management personnel. Turnover rates tend to be quite low in this program as in other North Dakota program areas. A high degree of job satisfaction has been indicated by North Dakota personnel.

TABLE XVIII

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Solid Waste Management
Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Engineer[1]	1	0%
Sanitarian[2]	1	*
Secretarial[2]	1	N/A
TOTAL	3	N/A

* unavailable

[1] Division Director; [2] less than full-time.

The following table presents a composite of the best professional judgements as to the statewide workforce. The majority of the personnel will be municipal or county employees, while approximately three to five percent are from the private sector.

TABLE XIX

STATE OF NORTH DAKOTA

Solid Waste Management Personnel
Current (1976) Staffing Level
(estimated)

Position	1976	%/annum turnover (average)
Engineer[1]	6	1%
Sanitarian	8	4%
Landfill Operator	75	20%
TOTAL	89	N/A

[1] may be as high as 10 or as low as 4.

C. Workforce Projections

Enforcement will become more stringent in North Dakota. Hazardous waste disposal is a program responsibility which will be more completely addressed in the next few years. Two alternatives have been suggested: specifically designed disposal sites can be developed at strategically located areas of the state, and/or storage sites can be built in accessible locales of the state.

Due to increasing program activities and an enlarged area of responsiblity, the Division of Solid Waste Management will experience staff increases over the next few years. The table following details this estimated growth.

TABLE XX

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Solid Waste Management
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	1	1	1	2	2	2	0%	20%
Sanitarian	1	1	1	2	2	2	*	20%
Chemist	0	0	1	1	1	1	*	20%
Geologist	0	0	0	1	1	1	*	20%
Public Health Executive	0	1	1		1	1	*	20%
Secretarial	1	1	1		2	2	N/A	20%
TOTAL	3	4	5	8	9	9	N/A	26%

* unavailable.

Division of Solid Waste Management personnel feel there will be almost no increase in engineers or in sanitarians across the state. The landfill operators will experience an approximate per annum growth rate of 14%. The following table depicts the workforce requirements to 1982.

TABLE XXI

STATE OF NORTH DAKOTA

Solid Waste Management Personnel
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer[1]	6	6	6	6	6	7	1%	3%
Sanitarian[1]	8	8	8	8	8	9	4%	3%
Landfill Operator	75	85	95	105	115	125	20%	11%
TOTAL	89	99	109	119	129	141	N/A	9%

D. Training and Certification

North Dakota is involved in very little training in the area of solid waste. Personnel from the Division of Water Supply & Pollution Control have participated with the Division of Solid Waste Management in the training of solid waste collection and disposal facilities operators. Currently there is no certification. A certification program for operators might assist in upgrading and would help lower the accident rate in the field. Solid waste management personnel suffer a higher rate of occupationally related accidents than other job categories.

Operators in North Dakota will be in need of hazardous wastes disposal training.

E. Career Potential

Career options will be available over the next three to five years, especially in the areas of resource recovery and hazardous wastes. A demand for heavy equipment operators skilled not only in equipment usage but in landfill practices, should exist. Highly trained engineers, geologists, and hydrologists may also find careers in the management of hazardous waste in such areas as site selection and design and development of methods of disposal.

F. Conclusion

Solid waste collection and disposal are conducted in North Dakota on a fee basis similar to water supply tariffs. The community does not find it necessary under these conditions to seek methods of financing

such as increasing taxes. The state is encourageing the centralized or area wide landfill. This not only allocates disposal to a specific area but costs are lessened. According to Solid Waste Management in North Dakota, Gerald W. Knudsen, May, 1976, it would be easier to establish resource recovery sites in a situation where collection systems had previously been developed.

North Dakota has certain areas in which there are thick deposits of impermeable soil. These areas present ideal locations for disposal of hazardous wastes as contamination of groundwater would be likely. Private sector interests are considering North Dakota as a hazardous waste disposal site. A thorough solid waste survey, however, has not as yet been completed in the state. A survey of this nature, according to Solid Waste Management in North Dakota, is prerequisite to encouraging the entrance of the private sector into the solid waste market place.

Division personnel also believe resource recovery to be feasible for Grand Forks, Fargo and Mismarck-Mandan due to the geology and hydrology of the area. Metal shredders might be installed, and the materials incinerated to provide heat, for example, at about 66 percent the heat value of North Dakota lignite.

VII. WASTE WATER

A. Introduction

According to the Office of the Assistant Attorney General of North Dakota, the state has some of the most stringent water pollution laws in the country. Approximately 50 water pollution-related cases are processed through this office per year.

Most of the state's serious waste water problems originate from agricultural and energy-related activities. Under the Federal Water Pollution Control Act Amendments of 1972, provisions are made for area wide planning to control water pollution. This is referred to as Section 208 of the Act. The planning process begins when the Governor designates a statewide or regional area as a 208 planning area. One area which includes 10 North Dakota counties has been so designated.

B. Workforce Profile

The major responsibility for water pollution control in North Dakota has been allocated to the Department of Health, the Division of Water Supply & Pollution Control. This division is also responsible for drinking water. The division is responsible for reviewing plans and specifications for municipal and industrial waste water treatment facilities. Training of waste water treatment plant operators is conducted by personnel from this Division.

The following table details the current staffing levels of the Division of Water Supply & Pollution Control, Waste Water section.

TABLE XXII

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Water Supply & Pollution Control
Current (1976) Staffing Level - Waste Water

Position	(a)	1976	%/annum turnover (average)
Program Director	0	1	0%
Environmental Engineer	4	7	1%
Sanitarian	0	4	3%
State Training Officer	0	1	0%
Biologist	1	2	*
Statistician	0	1	2%
Microbiologist	0	1	*
Chemist	1	2	*
Secretarial	1	4	N/A
TOTAL	7	23	N/A

(a) Section 208 personnel included in 1976 figures.

The following table illustrates the current (1976) certified waste water treatment plant operator workforce across the State of North Dakota. It is noted that classification I is entry-level.

TABLE XXIII

NORTH DAKOTA WASTE WATER TREATMENT PLANT PERSONNEL

Certified Operators
Current (1976) Staffing Level

Classification	1976	%/annum turnover (average)
I (lowest)	82	15%
II	29	15%
III	15	3%
IV (highest)	8	1%
TOTAL	134	8.5%

C. Workforce Projections

The following tables describe the projected workforce requirements to 1982. These estimates are a compilation of judgements of professionals in the field.

TABLE XXIV

NORTH DAKOTA DEPARTMENT OF HEALTH

Division of Water Supply & Pollution Control
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Program Director	1	1	1	1	1	1	0%	0%
Environmental Engineer	7	8	8	9	10	11	1%	10%
Sanitarian	4	5	6	6	7	7	3%	12%
State Training Officer	1	1	1	1	1	2	0%	20%
Biologist	2	2	2	2	2	2	*	0%
Statistician	1	1	1	1	1	1	2%	0%
Microbiologist	1	1	1	1	1	1	*	0%
Chemist	2	2	2	2	2	2	*	0%
Secretarial	4	5	5	6	6	6	N/A	9%
TOTAL	23	26	27	29	31	33	N/A	7%

* unavailable

Engineering increases as depicted in the above table will be utilized predominantly to address erosion control problems. No specific increases are destined for the 208 Planning personnel; however, Division personnel are able to be allocated to this section when the need arises.

The table below depicts the projected wastewater treatment plant operator workforce requirements to 1982. It is noted that the percentage increases decline from 1976 to 1981. The largest number of personnel increases is to be seen at the entry level, classification I.

TABLE XXV

NORTH DAKOTA WASTE WATER TREATMENT PLANT PERSONNEL

Certified Operators
Workforce Projections to 1982 (est.)

Class	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
I	82	90	98	106	113	118	15%	8%
II	29	30	31	32	33	34	15%	3%
III	15	15	16	16	16	17	3%	3%
IV	8	8	8	9	9	9	1%	3%
TOTAL	134	143	153	163	171	178	8.5%	6%

D. Training and Certification

One annual week-long school is held each year in North Dakota for the purpose of training wastewater treatment plant operating and supervisory personnel. This school is conducted by Division personnel in conjunction with the North Dakota State University at Fargo. This annual school is three pronged in content: remedial math and science, wastewater specifics of treatment and plant supervision, and water-specific courses.

Each year the division requests federal training grants. These monies are utilized for training efforts of one day per week for twelve weeks.

These twelve sessions cover the same course material as the week-long school but in greater detail.

The examination for operator certification is given twice each year. Participants at the annual week-long school at Fargo are tested upon completion of training. The examination is administered a second time during the year at the close of the North Dakota Water and Wastewater Conference which is held in a different location each year.

E. Career Potential

Career opportunities will be available to 1982 at the degreed and non-degreed level. Operator turnover is not as high in North Dakota as in other Rocky Mountain prairie states. North Dakota is sparsely populated and thus, large numbers of career opportunities will not be present.

F. Conclusion

Workforce needs will be in wastewater treatment plant operations and maintenance as well as in administration. This will be a result of strict enforcement, new methods of treatment, changing technology and plant modification and construction.

Increased upgrade training and continued construction of municipal wastewater treatment facilities as well as extensive activities related to 208 planning will compose major components of the future North Dakota water pollution control efforts.

VIII. ENERGY

A. Introduction

The development of their natural resources is an area of major concern which confronts the people of North Dakota. These concerns become even more dramatically displayed when one realizes that the state is presently developing the final portions of a State Energy Plan for review by the Legislature. Energy extraction and conversion activities need to be responsibly explored as well as conservation plans.

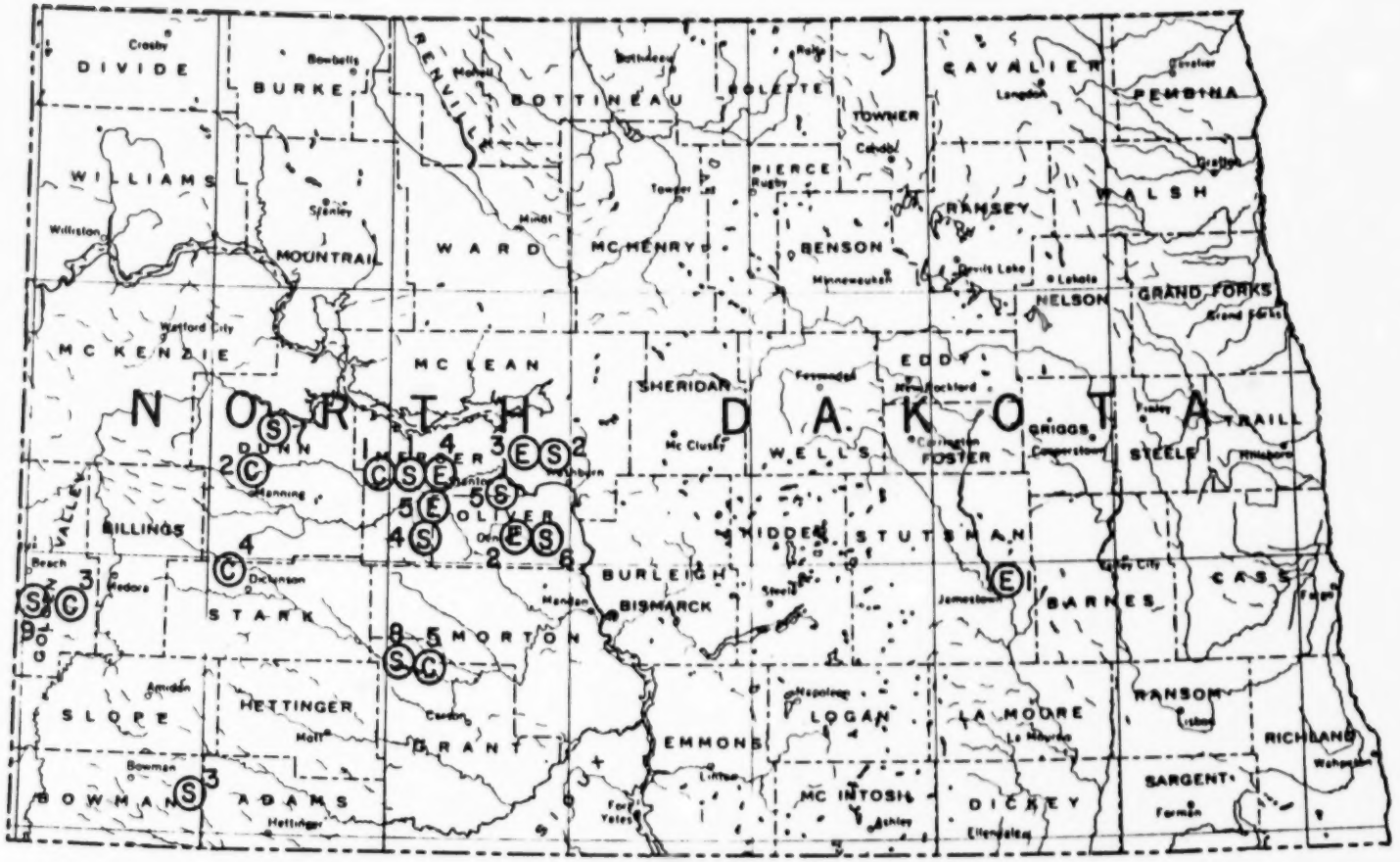
The Bureau of Mines Information, Circular #8719, Projects to Expand Fuel Sources in Western States, Washington, D.C., 1976 lists potential fuels related projects for the state. Nine coal mines, five electric power plants and five coal conversion plants have been proposed. (Refer to figure on following page.) In addition, North Dakota is being considered as the location for a uranium enrichment plant.

B. Workforce Profile

The State of North Dakota lead energy agency has been identified as the Office of Energy Management, Bismarck. The major responsibility and purpose of this agency is the administration of the federal allocation program. The staff is small as may be seen in the following table. Recently, the additional topic of conservation has been defined as an area of responsibility for the Office of Energy Management.

Data for the workforce profile and projections were obtained through on-site and telephone interviews.

Figure 7 FUELS RELATED PROJECTS IN NORTH DAKOTA



Ⓢ Strip coal mine Ⓒ Coal conversion plant Ⓔ Electric powerplant

SOURCE: Projects to Expand Fuel Sources in Western States. Washington, D. C. Bureau of Mines, 1976.

TABLE XXVI

NORTH DAKOTA OFFICE OF ENERGY MANAGEMENT

Current (1976) Staffing Level

Position	1976	%/annum turnover (average)
Governor's Energy Coordinator	1	0%
Energy Coordinator Assistant	1	0%
Conservationist	2	0%
Fuel Allocation Manager	1	0%
Secretarial	2	0%
TOTAL	7	0%

This agency was only recently formed and has no turnover history to date.

Specific workforce figures for the private sector are not available. No information could be obtained concerning the number of personnel engaged in various forms of energy development as it pertains to environmental pollution and control activities.

C. Workforce Projections

Because this agency is newly created and information regarding the private sector is scarce, workforce projections are highly tentative at this time. Experts in the field propose the addition of one Environmental Engineer to this agency over the next three years. Staffing increases are constrained by a present lack of a State Energy Plan also.

D. Training and Certification

Currently the Office of Energy Management holds a limited number of workshops and seminars which involve industry and the public at large.

More extensive work with the public regarding conservation issues will be a trend of the near future. Some participation with utilities companies in the area of educating the public to conservation has been on-going but will increase considerably after the final review of the State Energy Plan.

E. Career Potential

Career opportunities are expected to develop over the next three to five years for degreed and highly trained engineers, scientists and research personnel. Few career opportunities are likely to emerge for the non-degreed personnel.

F. Conclusion

North Dakota has large supplies of crude oil and refined petroleum products available to the state. The state's most urgent problems are related to coal development and the utilization of water resources. Energy development is closely aligned with water availability and allocation.

Regarding land-use planning, North Dakota currently has the authority to determine the siting of power plants and related facilities. As reported in Environmental Quality - 1976, the state has statutory authority to regulate surface mines and has adopted rules and regulations accordingly.

The presently reported workforce, seven professionals, should experience growth over the next five years. In the private sector, growth will be more substantial. North Dakota has vast lignite reserves, the increased extraction and development of which seems more and more feasible. These extraction and development activities most assuredly will affect the pollution control and abatement workforce of the state.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

The higher education institutions of North Dakota offer a very limited number of environmental programs. Several colleges do offer majors in engineering, earth science, biology, agronomy, botany, chemistry, entomology and similar areas which can provide a good background for environmental employment.

At North Dakota State University an Environmental Studies program has been developed although a major is not available in the discipline. Also an environmental concentration is available in the earth science major.

On the two-year level, environmental offerings are also very limited. An Environmental Sciences Technology program at North Dakota State School of Science is apparently the only two-year course available in the state. This program grew out of - and works closely with - the Civil Technology major at the school.

A more detailed discussion of these environmental programs for the State of North Dakota is contained on the following pages.

SENIOR INSTITUTIONS

North Dakota State University
Fargo, North Dakota

Program: Environmental Studies

The University offers an Environmental Studies Program through the College of Science and Mathematics. The series is designed to assist students in developing the multidisciplinary understanding that is important in finding responsible solutions to environmental problems.

Geologists, biologists, and engineers team with professors in climatology, sociology, religion, economics, philosophy, and other disciplines to explore the nature of our environment and what may be done to protect it.

Students normally select a strong major in a discipline of their choice; all environmental courses are electives to be applied to majors in other disciplines.

Courses

Man in the Ecosystem
Resources of the World
Technology of the Environment
Environmental Ethics
Socioeconomics of the Environment
Environmental Decision Making
Applied Environmental Analysis

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

North Dakota State School of Sciences
Wahpeton, North Dakota

Program: Environmental Sciences Technology (A.S.)

Hours required for major: Quarter - 120
Program Inception: 1972
Staff Size: Four part-time instructors
Enrollment: 6
Graduates (1976): 10-12
Placement: all
Graduate Work: 0

Courses

Biology
Chemistry
Field Ecology
Introduction to Environmental Technology
Earth Science
Water Treatment Techniques

State Legislation

NORTH DAKOTA AIR

TITLE:

Air Pollution Control Law
North Dakota Code 23-25

PURPOSE:

To achieve and maintain the best air quality possible to protect human health, welfare and property.

DEFINITIONS:

1. Air contaminant
2. Air pollution
3. Ambient air
4. Emission
5. Person
6. Emission standard
7. Air quality standard
8. Indirect air contaminant source

ADMINISTERING AUTHORITY:

Department of Health
Air Pollution Control Advisory Council

AUTHORIZATIONS:

To conduct studies regarding air pollution causes and effects;
To issue regulations pursuant to the act;
To establish ambient air quality standards and emission control requirements;
To issue variances under the act;
To generally abate air pollution and enforce the law;
To issue permits for air contaminant sources;
To enter and inspect property in the enforcement of the act.

PROHIBITED ACTS:

To violate air quality standards, permit conditions, or other regulations or act provisions.

PENALTIES:

Fines of up to $10,000.

NORTH DAKOTA NOISE

TITLE:

Noise Control Act
North Dakota Code 23-01-17

PURPOSE:

To protect the health and safety of the people of the state through the regulation of noise.

DEFINITIONS:

ADMINISTERING AUTHORITY:

State Health Council

AUTHORIZATIONS:

To establish noise standards for farm machinery, tools, construction equipment, motor-powered vehicles, musical instruments and other devices;
To issue regulations pursuant to the act.

PROHIBITED ACTS:

To violate standards or regulations under the act.

EXEMPTIONS:

Aircraft operations.

PENALTIES:

Violation constitutes Class A misdemeanor.

NORTH DAKOTA PESTICIDES

TITLE:

North Dakota Pesticide Act of 1975
North Dakota Code 4-35

PURPOSE:

To regulate the disposal, use and application of pesticides to prevent harm to human health and the environment.

DEFINITIONS:

1. Animal
2. Antidote
3. Beneficial insects
4. Certified applicator
5. Private applicator
6. Commercial applicator
7. Defoliant
8. Desiccant
9. Device
10. Distribute
11. Environment
12. Equipment
13. Fungus
14. Insect
15. Label
16. Labeling
17. Land
18. Nematode
19. Person
20. Pest
21. Pesticide
22. Pesticide dealer
23. Plant regulator
24. Protect health and environment
25. Public operator
26. Restricted use pesticide
27. Snails or slugs
28. Tank mix
29. Unreasonable adverse effect on the environment
30. Weed
31. Wildlife

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Control Board

AUTHORIZATIONS:

To issue regulations regarding pesticide use and application;
To establish certification standards for applicators;
To comply with federal guidelines;
To provide for pesticide safety in use, storage and disposal;
To issue experimental use permits;
To classify commercial applicator licenses and certify applicators;
To license pesticide dealers;
To certify private applicators.

CERTIFICATION OR LICENSING:

Restricted pesticide dealers must be licensed; commercial and private applicators of restricted pesticides must be certified; exam required of commercial applicators. Classifications established.

PROHIBITED ACTS:

To use or sell restricted pesticides without proper certificate or license;
To make false claims or statements;
To violate terms of any license or certificate;
To store, discard or dispose of pesticides or containers to cause environmental harm.

EXEMPTIONS:

Non-restricted pesticides;
Laboratory research activities.

PENALTIES:

Violations by non-private applicators constitute class A misdemeanor;
Violations by private applicators constitute class B misdemeanor.

NORTH DAKOTA POTABLE WATER

TITLE:

Operator Certification Law
North Dakota Code 23-26

PURPOSE:

To provide for the certification of all public water supply and waste water treatment plant operators.

DEFINITIONS:

1. Department
2. Board
3. Certificate
4. Water supply system
5. Water treatment plant
6. Water distribution system
7. Waste water treatment plant
8. Operator

ADMINISTERING AUTHORITY:

Department of Health
Board of Certification

AUTHORIZATIONS:

To classify all water treatment, distribution and waste water facilities;
To certify water facility operators;
To issue regulations pursuant to the act.

CERTIFICATION OR LICENSING:

All operators of water treatment plants, distribution systems and waste water plants must be certified according to facility classification. Examination is required unless prior operator.

PROHIBITED ACTS:

To operate a treatment facility without properly certified operator.

PENALTIES:

Violations constitute misdemeanor.

NORTH DAKOTA SOLID WASTE

TITLE:

Solid Waste Management and Land Protection Act
North Dakota Code 23-29

PURPOSE:

To plan for and regulate solid waste management, storage, collection and disposal to protect public health and welfare.

DEFINITIONS:

1. Collection
2. Department
3. Person
4. Sanitary landfill
5. Solid wastes
6. Solid waste management
7. Storage
8. Transport

ADMINISTERING AUTHORITY:

Department of Health

AUTHORIZATIONS:

To administer the state solid waste program;
To provide solid waste assistance to local agencies;
To act as the state lead agency in solid waste matters;
To issue regulations governing solid waste storage, collection, transport and disposal;
To issue permits for solid waste systems and facilities;
To inspect and supervise all solid waste facilities.

PROHIBITED ACTS:

To store, transport or dispose of solid waste in violation of act regulations;
To operate or use a solid waste facility without a permit.

EXEMPTIONS:

Disposal of owner's solid waste on own land.

PENALTIES:

Violations constitute Class A misdemeanor.

NORTH DAKOTA WASTE WATER

TITLE:

Control, Prevention, and Abatement of Pollution of Surface Waters Law
North Dakota Code 61-28

PURPOSE:

To protect, maintain and improve the quality of waters of the state for continued public, commercial and other beneficial uses.

DEFINITIONS:

1. Pollution
2. Wastes
3. Sewerage system
4. Treatment works
5. Disposal system
6. Waters of the state
7. Person
8. Department
9. Board
10. Point source
11. Discharge

ADMINISTERING AUTHORITY:

State Department of Health
Water Pollution Control Board

AUTHORIZATIONS:

To develop water pollution control, abatement and prevention programs;
To conduct studies and investigations regarding water pollution;
To control water pollutnat discharges;
To issue regulations pursuant to the act;
To approve and permit disposal system construction;

AUTHORIZATIONS (Cont'd):

To control the operation and maintenance of disposal systems;
To act as the state lead agency in water pollution matters;
To classify and establish use standards for water sources.

PROHIBITED ACTS:

To cause or allow any water pollution;
To violate, through discharge, water quality standards;
To construct, alter or operate disposal system without a permit.

PENALTIES:

Criminal - first willful violation, fines of up to $25,000 per day or one year imprisonment; subsequent violations, fines of up to $50,000 per day or two years imprisonment;
Civil - fines of up to $10,000 per day.